

U.S. Patent Application Serial No. 10/572,852
Response to Final OA dated March 26, 2008

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AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (Currently Amended): A method of forming a product of a metal-based composite material, comprising the steps in the order named of:

preparing a billet of a metal-based composite material by mixing a metal matrix and particles of ceramic reinforcing material;

heating the billet to a specific temperature, the specific temperature being equal to or above the solidus temperature of the metal matrix and a liquid phase being present in the metal matrix; and

pressure forming the heated billet in a die assembly, ~~so that~~ into a formed product by reciprocating a punch relative to a die, wherein the billet and the punch and die are configured such that the billet while being pressure formed has a compression ratio H/h_1 differing from one portion of the formed product to another to ~~cause the metal matrix to flow through among the particles of the ceramic reinforcing material in a lateral outward direction while allowing nearly all of the particles of the ceramic reinforcing material to stay in a central portion of the billet being pressure formed with the remainder being forced by the metal matrix to flow in the lateral outward direction as the metal matrix flows in the lateral outward direction~~, thereby ~~giving~~ give the formed product a ceramic volume content differing from one portion to another, where H is the height of the billet prior to pressure forming and h_1 is ~~[[the]]~~ a thickness of the formed product~~[[,]]~~ and corresponds

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to a height of the billet after pressure forming the formed product containing the particles of the ceramic reinforcing material distributed over the entire region thereof, wherein during the pressure forming, the punch advances toward the die at a speed not exceeding 300 mm/sec to control the ceramic volume content of the formed product and an advancing movement of the punch toward the die at the speed not exceeding 300 mm/sec causes the metal matrix to flow out from the heated billet into a space defined between the punch and the die while nearly all of the particles of the ceramic reinforcing material are caused to move in the same direction as the advancing movement of the punch, the remainder of the particles of the ceramic reinforcing material being forced by the metal matrix to flow in the same direction as the metal matrix, and wherein the ceramic volume content of the formed product is directly proportional to the compression ratio of the billet.

Claim 2 (Original): The method of claim 1, wherein the billet has a height varying from one portion to another.

Claim 3 (Original): The method of claim 1, wherein the pressure forming employs a split die assembly.

Claim 4 (Original): The method of claim 1, wherein the pressure forming employs a die assembly having heat insulation in its portions contacting the billet.

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Claim 5 (Previously Presented): The method of claim 1, wherein an aluminum alloy is employed as the matrix, and an alumina aggregate as the ceramic.

Claim 6 (Original): The method of claim 1, wherein the step of heating is carried out for heating the billet to or above 580°C.

Claim 7 (Previously Presented): The method of claim 2, wherein an aluminum alloy is employed as the matrix, and an alumina aggregate as the ceramic.

Claim 8 (Previously Presented): The method of claim 3, wherein an aluminum alloy is employed as the matrix, and an alumina aggregate as the ceramic.

Claim 9 (Previously Presented): The method of claim 4, wherein an aluminum alloy is employed as the matrix, and an alumina aggregate as the ceramic.

Claim 10 (New): The method of claim 1, wherein the advancing speed of the punch toward the die during the pressure forming is not less than 5 mm/sec.